Chronic obstructive pulmonary disease: management of chronic obstructive pulmonary disease in adults in primary and secondary care (partial update)

NICE guideline
Draft for consultation, November 2009

If you wish to comment on this version of the guideline, please be aware that all the supporting information and evidence is contained in the full version.
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This guidance is a partial update of NICE clinical guideline 12 (published February 2004) and will replace it.

New recommendations have been added on spirometry, assessment of prognostic factors, and to the section on inhaled therapy (which now incorporates the previously separate sections on inhaled bronchodilators, inhaled corticosteroids and inhaled combination therapy).

Where recommendations are shaded in grey and end [2004] the evidence has not been updated since the original guideline. Yellow shading in these recommendations indicates where wording changes have been made for the purposes of clarification only. You are invited to comments on the new and updated recommendations in this guideline only. These are marked as [2010] if the evidence has been reviewed but no change has been made to the recommendation or [new 2010] if the evidence has been reviewed and the recommendation has been updated or added.

Appendix D contains recommendations from the 2004 guideline that NICE proposes deleting in the 2010 update. This is because the evidence has been reviewed and the recommendation has been updated or because NICE has updated the relevant guidance and has replaced the original recommendations. Where there are replacement recommendations based on a review of the evidence, this information is provided. Where there is no replacement recommendation, an explanation for the proposed deletion is given. You are invited to comment on the deleted recommendations as part of the consultation on the 2010 update.

The original NICE guideline and supporting documents are available from www.nice.org.uk/CG12
Introduction

An estimated 3 million people have chronic obstructive pulmonary disease (COPD) in the UK. About 900,000 have diagnosed COPD and an estimated 2 million people have COPD which remains undiagnosed\(^1\). Most patients are not diagnosed until they are in their fifties.

COPD is characterised by airflow obstruction and the condition is predominantly caused by smoking. The airflow obstruction is usually progressive, not fully reversible and does not change markedly over several months.

There is no single diagnostic test for COPD. Making a diagnosis relies on clinical judgement based on a combination of history, physical examination and confirmation of the presence of airflow obstruction using spirometry.

The guideline will assume that prescribers will use a drug’s summary of product characteristics to inform decisions made with individual patients.

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Patient-centred care

This guideline offers best practice advice on the care of people with COPD.

Treatment and care should take into account patients’ needs and preferences. People with COPD should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If people do not have the capacity to make decisions, healthcare professionals should follow the Department of Health’s advice on consent (available from www.dh.gov.uk/consent) and the code of practice that accompanies the Mental Capacity Act (summary available from www.publicguardian.gov.uk).

If the person is under 16, healthcare professionals should follow the guidelines in ‘Seeking consent: working with children’ (available from www.dh.gov.uk).

Good communication between healthcare professionals and patients is essential. It should be supported by evidence-based written information tailored to the patient’s needs. Treatment and care, and the information patients are given about it, should be culturally appropriate. It should also be accessible to people with additional needs such as physical, sensory or learning disabilities, and to people who do not speak or read English.

If the person agrees, families and carers should have the opportunity to be involved in decisions about treatment and care.

Families and carers should also be given the information and support they need.
Key priorities for implementation

The following recommendations have been identified as priorities for implementation.

<table>
<thead>
<tr>
<th>Diagnose COPD</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• A diagnosis of COPD should be considered in patients over the age of 35</td>
<td>who have a risk factor (generally smoking) and who present with exertional breathlessness, chronic cough, regular sputum production, frequent winter ‘bronchitis’ or wheeze. [2004]</td>
</tr>
<tr>
<td>• The presence of airflow obstruction should be confirmed by performing</td>
<td>post-bronchodilator spirometry. All health professionals managing patients with COPD should have access to spirometry and be competent in the interpretation of the results. [2004]</td>
</tr>
<tr>
<td>Stop smoking</td>
<td></td>
</tr>
<tr>
<td>• Encouraging patients with COPD to stop smoking is one of the most</td>
<td>important components of their management. All COPD patients still smoking, regardless of age, should be encouraged to stop, and offered help to do so, at every opportunity. [2004]</td>
</tr>
<tr>
<td>Give effective inhaled therapy</td>
<td></td>
</tr>
<tr>
<td>• In people with stable COPD who remain breathless or have exacerbations</td>
<td>despite use of short-acting bronchodilators as required, offer the following as maintenance therapy:</td>
</tr>
<tr>
<td>• if FEV₁ ≥ 50%: long-acting beta₂ agonist (LABA) or LAMA</td>
<td></td>
</tr>
<tr>
<td>• if FEV₁ &lt; 50%: LABA with an inhaled corticosteroid (ICS) in a combination</td>
<td></td>
</tr>
<tr>
<td>inhaler, or LAMA. [new 2010]</td>
<td></td>
</tr>
<tr>
<td>• Offer LAMA in addition to LABA+ICS to people with COPD who remain</td>
<td>breathless or have exacerbations despite taking LABA+ICS, irrespective of their FEV₁. [new 2010]</td>
</tr>
</tbody>
</table>
Provide pulmonary rehabilitation for all who need it

- Pulmonary rehabilitation should be made available to all appropriate patients with COPD including those who have had a recent hospitalisation for an acute exacerbation. [new 2010]

Use non-invasive ventilation

- Non-invasive ventilation (NIV) should be used as the treatment of choice for persistent hypercapnic ventilatory failure during exacerbations not responding to medical therapy. It should be delivered by staff trained in its application, experienced in its use and aware of its limitations.
- When patients are started on NIV, there should be a clear plan covering what to do in the event of deterioration and ceilings of therapy should be agreed. [2004]

Manage exacerbations

- The frequency of exacerbations should be reduced by appropriate use of inhaled corticosteroids and bronchodilators, and vaccinations. [2004]

- The impact of exacerbations should be minimised by:
  - giving self-management advice on responding promptly to the symptoms of an exacerbation
  - starting appropriate treatment with oral steroids and/or antibiotics
  - use of non-invasive ventilation when indicated
  - use of hospital-at-home or assisted-discharge schemes. [2004]

Multidisciplinary working

- COPD care should be delivered by a multidisciplinary team. [2004]
1 Guidance

The following guidance is based on the best available evidence. The full guideline (www.nice.org.uk/CG12) gives details of the methods and the evidence used to develop the guidance.

1.1 Diagnosing COPD

The diagnosis of COPD depends on thinking of it as a cause of breathlessness or cough. The diagnosis is suspected on the basis of symptoms and signs supported by spirometry.

1.1.1 Symptoms

1.1.1.1 A diagnosis of COPD should be considered in patients over the age of 35 who have a risk factor (generally smoking) and who present with one or more of the following symptoms:

- exertional breathlessness
- chronic cough
- regular sputum production
- frequent winter ‘bronchitis’
- wheeze. [2004]

1.1.1.2 Patients in whom a diagnosis of COPD is considered should also be asked about the presence of the following factors:

- weight loss
- effort intolerance
- waking at night
- ankle swelling
- fatigue
- occupational hazards
- chest pain
- haemoptysis.
NB These last two symptoms are uncommon in COPD and raise the possibility of alternative diagnoses. [2004]

1.1.1.3 One of the primary symptoms of COPD is breathlessness. The Medical Research Council (MRC) dyspnoea scale (see Table 1) should be used to grade the breathlessness according to the level of exertion required to elicit it. [2004]

<table>
<thead>
<tr>
<th>Grade</th>
<th>Degree of breathlessness related to activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not troubled by breathlessness except on strenuous exercise</td>
</tr>
<tr>
<td>2</td>
<td>Short of breath when hurrying or walking up a slight hill</td>
</tr>
<tr>
<td>3</td>
<td>Walks slower than contemporaries on level ground because of breathlessness, or has to stop for breath when walking at own pace</td>
</tr>
<tr>
<td>4</td>
<td>Stops for breath after walking about 100 m or after a few minutes on level ground</td>
</tr>
<tr>
<td>5</td>
<td>Too breathless to leave the house, or breathless when dressing or undressing</td>
</tr>
</tbody>
</table>


1.1.2 Spirometry

1.1.2.1 Spirometry should be performed:

- at the time of diagnosis
- to reconsider the diagnosis, if patients show an exceptionally good response to treatment. [2010]

1.1.2.2 Measure post-bronchodilator spirometry to confirm the diagnosis of COPD. [new 2010]

1.1.2.3 Consider alternative diagnoses or investigations in:

- older people with no symptoms of COPD where the FEV\textsubscript{1} / FVC ratio is <0.7
- younger people with symptoms of COPD where the FEV\textsubscript{1} / FVC ratio is >0.7. [new 2010]
1.1.2.4 All health professionals managing patients with COPD should have access to spirometry and be competent in the interpretation of the results. [2010]

1.1.2.5 Spirometry can be performed by any healthcare worker who has undergone appropriate training and who keeps his or her skills up to date. [2010]

1.1.2.6 Spirometry services should be supported by quality control processes. [2010]

1.1.2.7 It is recommended that ERS 1993 reference values\(^2\) are used but it is recognised that these values may lead to under-diagnosis in older people and are not applicable in black and Asian populations. [2004]

1.1.3 Further investigations

1.1.3.1 At the time of their initial diagnostic evaluation in addition to spirometry all patients should have:

- a chest radiograph to exclude other pathologies
- a full blood count to identify anaemia or polycythaemia
- body mass index (BMI) calculated. [2004]

1.1.3.2 Additional investigations should be performed to aid management in some circumstances (see Table 2). [2004]

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Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
Table 2 Additional investigations

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial domiciliary peak flow measurements</td>
<td>To exclude asthma if diagnostic doubt remains</td>
</tr>
<tr>
<td>Alpha-1 antitrypsin</td>
<td>If early onset, minimal smoking history or family history</td>
</tr>
<tr>
<td>Transfer factor for carbon monoxide (Tl,CO)</td>
<td>To investigate symptoms that seem disproportionate to the spirometric impairment</td>
</tr>
<tr>
<td>CT scan of the thorax</td>
<td>To investigate symptoms that seem disproportionate to the spirometric impairment</td>
</tr>
<tr>
<td></td>
<td>To investigate abnormalities seen on a chest radiograph</td>
</tr>
<tr>
<td></td>
<td>To assess suitability for surgery</td>
</tr>
<tr>
<td>ECG</td>
<td>To assess cardiac status if features of cor pulmonale</td>
</tr>
<tr>
<td>Echocardiogram</td>
<td>To assess cardiac status if features of cor pulmonale</td>
</tr>
<tr>
<td>Pulse oximetry</td>
<td>To assess need for oxygen therapy</td>
</tr>
<tr>
<td></td>
<td>If cyanosis, or cor pulmonale present, or if FEV1 &lt; 50% predicted</td>
</tr>
<tr>
<td>Sputum culture</td>
<td>To identify organisms if sputum is persistently present and purulent</td>
</tr>
</tbody>
</table>

1.1.3.3 Patients identified as having alpha-1 antitrypsin deficiency should be offered the opportunity to be referred to a specialist centre to discuss the clinical management of this condition. [2004]

1.1.4 Reversibility testing

1.1.4.1 In most patients routine spirometric reversibility testing is not necessary as a part of the diagnostic process or to plan initial therapy with bronchodilators or corticosteroids. It may be unhelpful or misleading because:

- repeated FEV1 measurements can show small spontaneous fluctuations
- the results of a reversibility test performed on different occasions can be inconsistent and not reproducible
over-reliance on a single reversibility test may be misleading unless the change in FEV$_1$ is greater than 400 ml
the definition of the magnitude of a significant change is purely arbitrary
response to long-term therapy is not predicted by acute reversibility testing. [2004]

1.1.4.2 COPD and asthma are frequently distinguishable on the basis of history (and examination) in untreated patients presenting for the first time. Features from the history and examination (such as those listed in Table 3) should be used to differentiate COPD from asthma whenever possible. [2004]

Table 3 Clinical features differentiating COPD and asthma

<table>
<thead>
<tr>
<th></th>
<th>COPD</th>
<th>Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoker or ex-smoker</td>
<td>Nearly all</td>
<td>Possibly</td>
</tr>
<tr>
<td>Symptoms under age 35</td>
<td>Rare</td>
<td>Often</td>
</tr>
<tr>
<td>Chronic productive cough</td>
<td>Common</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>Persistent and progressive</td>
<td>Variable</td>
</tr>
<tr>
<td>Night time waking with breathlessness and/or wheeze</td>
<td>Uncommon</td>
<td>Common</td>
</tr>
<tr>
<td>Significant diurnal or day to day variability of symptoms</td>
<td>Uncommon</td>
<td>Common</td>
</tr>
</tbody>
</table>

1.1.4.3 Longitudinal observation of patients (whether using spirometry, peak flow or symptoms) should also be used to help differentiate COPD from asthma. [2004]

1.1.4.4 To help resolve cases where diagnostic doubt remains, or both COPD and asthma are present, the following findings should be used to help identify asthma:

• a large (> 400 ml) response to bronchodilators
• a large (> 400 ml) response to 30 mg oral prednisolone daily for 2 weeks
• serial peak flow measurements showing 20% or greater diurnal or day-to-day variability.

Clinically significant COPD is not present if the FEV₁ and FEV₁/FVC ratio return to normal with drug therapy. [2004]

1.1.4.5 If diagnostic uncertainty remains, referral for more detailed investigations, including imaging and measurement of TLCO, should be considered. [2004]

1.1.4.6 If patients report a marked improvement in symptoms in response to inhaled therapy, the diagnosis of COPD should be reconsidered. [2004]

1.1.5 Assessment of severity and prognostic factors

COPD is heterogeneous, and no single measure can give an adequate assessment of the true severity of the disease in an individual patient. Severity assessment is, nevertheless, important because it has implications for therapy and relates to prognosis.

1.1.5.1 Be aware that disability in COPD can be poorly reflected in the FEV₁. A more comprehensive assessment of severity includes the degree of airflow obstruction and disability, the frequency of exacerbations and the following known prognostic factors:

- FEV₁
- TLCO
- breathlessness (MRC scale)
- health status
- exercise capacity (for example, 6 minute walk test)
- BMI
- partial pressure of oxygen in arterial blood (PaO₂)
- cor pulmonale. [new 2010]
1.1.5.2 Calculate the BODE index to assess prognosis where its component information is currently available. [new 2010]

1.1.6 **Assessment and classification of severity of airflow obstruction**

1.1.6.1 The severity of airflow obstruction should be assessed according to the reduction in FEV\textsubscript{1} as shown in Table 4. [new 2010]

### Table 4 Gradation of severity of impairment of airflow obstruction

<table>
<thead>
<tr>
<th>Post-bronchodilator FEV\textsubscript{1} / FVC</th>
<th>NICE 2004\textsuperscript{4}</th>
<th>ATS / ERS \textsuperscript{5} \textsuperscript{2004}</th>
<th>GOLD 2008\textsuperscript{5}</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV\textsubscript{1} % predicted</td>
<td>Severity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;0.7 ≥ 80%</td>
<td>Mild</td>
<td>Stage 1 – Mild</td>
<td></td>
</tr>
<tr>
<td>&lt;0.7 50–79%</td>
<td>Mild</td>
<td>Moderate</td>
<td>Stage 2 – Moderate</td>
</tr>
<tr>
<td>&lt;0.7 30–49%</td>
<td>Moderate</td>
<td>Severe</td>
<td>Stage 3 – Severe</td>
</tr>
<tr>
<td>&lt;0.7 &lt; 30%</td>
<td>Severe</td>
<td>Very severe</td>
<td>Stage 4 – Very severe*</td>
</tr>
</tbody>
</table>

*or FEV\textsubscript{1} <50% with respiratory failure

1.1.7 **Identification of early disease**

1.1.7.1 Spirometry should be performed in patients who are over 35, current or ex-smokers, and have a chronic cough. [2004]

1.1.7.2 Spirometry should be considered in patients with chronic bronchitis. A significant proportion of these will go on to develop airflow limitation.\textsuperscript{6} [2004]

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Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
1.1.8 Referral for specialist advice

1.1.8.1 It is recommended that referrals for specialist advice are made when clinically indicated. Referral may be appropriate at all stages of the disease and not solely in the most severely disabled patients (see Table 5). [2004]

Table 5 Reasons for referral include

<table>
<thead>
<tr>
<th>Reason</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is diagnostic uncertainty</td>
<td>Confirm diagnosis and optimise therapy</td>
</tr>
<tr>
<td>Suspected severe COPD</td>
<td>Confirm diagnosis and optimise therapy</td>
</tr>
<tr>
<td>The patient requests a second opinion</td>
<td>Confirm diagnosis and optimise therapy</td>
</tr>
<tr>
<td>Onset of cor pulmonale</td>
<td>Confirm diagnosis and optimise therapy</td>
</tr>
<tr>
<td>Assessment for oxygen therapy</td>
<td>Optimise therapy and measure blood gases</td>
</tr>
<tr>
<td>Assessment for long-term nebuliser therapy</td>
<td>Optimise therapy and exclude inappropriate prescriptions</td>
</tr>
<tr>
<td>Assessment for oral corticosteroid therapy</td>
<td>Justify need for long-term treatment or supervise withdrawal</td>
</tr>
<tr>
<td>Bullous lung disease</td>
<td>Identify candidates for surgery</td>
</tr>
<tr>
<td>A rapid decline in FEV₁</td>
<td>Encourage early intervention</td>
</tr>
<tr>
<td>Assessment for pulmonary rehabilitation</td>
<td>Identify candidates for pulmonary rehabilitation</td>
</tr>
<tr>
<td>Assessment for lung volume reduction surgery</td>
<td>Identify candidates for surgery</td>
</tr>
<tr>
<td>Assessment for lung transplantation</td>
<td>Identify candidates for surgery</td>
</tr>
<tr>
<td>Dysfunctional breathing</td>
<td>Confirm diagnosis, optimise pharmacotherapy and access other therapists</td>
</tr>
<tr>
<td>Aged under 40 years or a family history of alpha₁-antitrypsin deficiency</td>
<td>Identify alpha₁-antitrypsin deficiency, consider therapy and screen family</td>
</tr>
<tr>
<td>Uncertain diagnosis</td>
<td>Make a diagnosis</td>
</tr>
<tr>
<td>Symptoms disproportionate to lung function deficit</td>
<td>Look for other explanations</td>
</tr>
<tr>
<td>Frequent infections</td>
<td>Exclude bronchiectasis</td>
</tr>
<tr>
<td>Haemoptysis</td>
<td>Exclude carcinoma of the bronchus</td>
</tr>
</tbody>
</table>

1.1.8.2 Patients who are referred do not always have to be seen by a respiratory physician. In some cases they may be seen by
1.2 Managing stable COPD

1.2.1 Smoking cessation

1.2.1.1 An up-to-date smoking history, including pack years smoked (number of cigarettes smoked per day, divided by 20, multiplied by the number of years smoked), should be documented for everyone with COPD. [2004]

1.2.1.2 All COPD patents still smoking, regardless of age, should be encouraged to stop, and offered help to do so, at every opportunity. [2004]

1.2.1.3 Unless contraindicated, offer NRT, varenicline or bupropion, as appropriate, to people who are planning to stop smoking combined with an appropriate support programme to optimise smoking quit rates for people with COPD. [2010]

The following two recommendations are from ‘Varenicline for smoking cessation’ (NICE technology appraisal guidance 123).

1.2.1.4 Varenicline is recommended within its licensed indications as an option for smokers who have expressed a desire to quit smoking [2007].

1.2.1.5 Varenicline should normally be prescribed only as part of a programme of behavioural support [2007].

See also ‘Smoking cessation services in primary care, pharmacies, local authorities and workplaces, particularly for manual working groups, pregnant women and hard to reach communities’ (NICE public health guidance 10).
1.2.2 Inhaled therapy

Short-acting beta2 agonists (SABA) and short-acting anticholinergics/short-acting muscarinic antagonists (SAMA)

1.2.2.1 Short-acting bronchodilators, as necessary, should be the initial empirical treatment for the relief of breathlessness and exercise limitation. [2004]

Inhaled corticosteroids

1.2.2.2 Oral corticosteroid reversibility tests do not predict response to inhaled corticosteroid therapy and should not be used to identify which patients should be prescribed inhaled corticosteroids. [2004]

1.2.2.3 Be aware of the potential risk of developing side effects (including non-fatal pneumonia) in people with COPD treated with high-dose inhaled corticosteroids and be prepared to discuss the risk with patients. [new 2010]

Inhaled combination therapy

This section provides recommendations on the sequence of inhaled therapies for people with stable COPD. These recommendations are also given in diagram form in algorithm 2a (see appendix C).

1.2.2.4 The effectiveness of bronchodilator therapy should not be assessed by lung function alone but should include a variety of other measures such as improvement in symptoms, activities of daily living, exercise capacity, and rapidity of symptom relief. [2004]

1.2.2.5 Offer once-daily long-acting muscarinic antagonist (LAMA) in preference to four-times-daily short-acting muscarinic antagonist (SAMA) in people with stable COPD who remain breathless or have exacerbations despite using short-acting bronchodilators as necessary, and in whom a decision has been made to commence
regular maintenance bronchodilator therapy with a muscarinic antagonist. [new 2010]

1.2.2.6 In people with stable COPD who remain breathless or have exacerbations despite use of short-acting bronchodilators as required, offer the following as maintenance therapy:

- if FEV₁ ≥ 50%: long-acting beta₂ agonist (LABA) or LAMA
- if FEV₁ < 50%: LABA with an inhaled corticosteroid (ICS) in a combination inhaler, or LAMA. [new 2010]

1.2.2.7 In people with stable COPD and an FEV₁ ≥ 50% who remain breathless or have exacerbations despite maintenance therapy with a LABA:

- consider offering LABA+ICS in a combination inhaler
- consider offering a LAMA in addition to LABA where ICS is declined or not tolerated. [new 2010]

1.2.2.8 Offer LAMA in addition to LABA+ICS to people with COPD who remain breathless or have exacerbations despite taking LABA+ICS, irrespective of their FEV₁. [new 2010]

1.2.2.9 Consider offering LABA+ICS in a combination inhaler in addition to LAMA to people with stable COPD who remain breathless or have exacerbations despite maintenance therapy with LAMA irrespective of FEV₁ [new 2010]

1.2.2.10 The choice of drug(s) should take into account the patient’s response to a trial of the drug, the drug’s side effects, patient preference and cost. [2010]

**Delivery systems used to treat patients with stable COPD**

Most patients – whatever their age – are able to acquire and maintain adequate inhaler technique given adequate instruction. The exception to this

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8 The BNF states that a SAMA should be discontinued when a LAMA is started. Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
is that those with significant cognitive impairment (as a guideline, those with a Hodkinson Abbreviated Mental Test Score of 4 or less) are unable to use any form of inhaler device. In most patients, however, a pragmatic approach guided by individual patient assessment is needed in choosing a device.

Inhalers

1.2.2.11 In most cases bronchodilator therapy is best administered using a hand-held inhaler device (including a spacer device if appropriate). [2004]

1.2.2.12 If the patient is unable to use a particular device satisfactorily, it is not suitable for him or her, and an alternative should be found. [2004]

1.2.2.13 Inhalers should be prescribed only after patients have received training in the use of the device and have demonstrated satisfactory technique. [2004]

1.2.2.14 Patients should have their ability to use an inhaler device regularly assessed by a competent healthcare professional and, if necessary, should be re-taught the correct technique. [2004]

1.2.2.15 To ensure optimum efficacy for each patient with COPD, the dose of medication should be titrated according to individual clinical response. [2004]

Spacers

1.2.2.16 The spacer should be compatible with the patient’s metered-dose inhaler. [2004]

1.2.2.17 It is recommended that spacers are used in the following way:

- the drug is administered by repeated single actuations of the metered dose inhaler into the spacer, with each followed by inhalation
• there should be minimal delay between inhaler actuation and inhalation
• tidal breathing can be used as it is as effective as single breaths. [2004]

1.2.2.18 Spacers should be cleaned no more than monthly as more frequent cleaning affects their performance (due to build up of static). They should be cleaned with water and washing-up liquid and allowed to air dry. The mouthpiece should be wiped clean of detergent before use. [2004]

Nebulisers
1.2.2.19 Patients with distressing or disabling breathlessness despite maximal therapy using inhalers should be considered for nebuliser therapy. [2004]

1.2.2.20 Nebulised therapy should not continue to be prescribed without assessing and confirming that one or more of the following occurs:

• a reduction in symptoms
• an increase in the ability to undertake activities of daily living
• an increase in exercise capacity
• an improvement in lung function. [2004]

1.2.2.21 Nebulised therapy should not be prescribed without an assessment of the patient’s and/or carer’s ability to use it. [2004]

1.2.2.22 A nebuliser system, that is known to be efficient, should be used. Once available, Comité European de Normalisation (European Committee for Standardisation, CEN) data should be used to assess efficiency. [2004]

1.2.2.23 Patients should be offered a choice between a facemask and a mouthpiece to administer their nebulised therapy, unless the drug
specifically requires a mouthpiece (for example, anticholinergic drugs). [2004]

1.2.2.24 If nebuliser therapy is prescribed, the patient should be provided with equipment, servicing, advice and support. [2004]

1.2.3 Oral therapy

Oral corticosteroids

1.2.3.1 Maintenance use of oral corticosteroid therapy in COPD is not normally recommended. Some patients with advanced COPD may require maintenance oral corticosteroids when these cannot be withdrawn following an exacerbation. In these cases, the dose of oral corticosteroids should be kept as low as possible. [2004]

1.2.3.2 Patients treated with long-term oral corticosteroid therapy should be monitored for the development of osteoporosis and given appropriate prophylaxis. Patients over the age of 65 should be started on prophylactic treatment, without monitoring. [2004]

Oral theophylline

In this section of the guideline, the term theophylline is used to mean slow-release formulations of this drug.

1.2.3.3 Theophylline should only be used after a trial of short-acting bronchodilators and long-acting bronchodilators, or in patients who are unable to use inhaled therapy, as there is a need to monitor plasma levels and interactions. [2004]

1.2.3.4 Particular caution needs to be taken with the use of theophylline in elderly patients because of differences in pharmacokinetics, the increased likelihood of co-morbidities and the use of other medications. [2004]
1.2.3.5 The effectiveness of the treatment with theophylline should be assessed by improvements in symptoms, activities of daily living, exercise capacity and lung function. [2004]

1.2.3.6 The dose of theophylline prescribed should be reduced at the time of an exacerbation if macrolide or fluoroquinolone antibiotics (or other drugs known to interact) are prescribed. [2004]

Oral mucolytic therapy

1.2.3.7 Mucolytic drug therapy should be considered in patients with a chronic cough productive of sputum. [2004]

1.2.3.8 Mucolytic therapy should be continued if there is symptomatic improvement (for example, reduction in frequency of cough and sputum production). [2004]

1.2.3.9 Do not routinely use mucolytic drugs for the prevention of exacerbations in people with stable COPD. [new 2010]

Oral anti-oxidant therapy

1.2.3.10 Treatment with alpha-tocopherol and beta-carotene supplements, alone or in combination, is not recommended. [2004]

Anti-tussive therapy

1.2.3.11 Anti-tussive therapy should not be used in the management of stable COPD. [2004]

Oral prophylactic antibiotic therapy

1.2.3.12 There is insufficient evidence to recommend prophylactic antibiotic therapy in the management of stable COPD. [2004]

1.2.4 Combined oral and inhaled therapy

1.2.4.1 If patients remain symptomatic on monotherapy, their treatment should be intensified by combining therapies from different drug classes. Effective combinations include:
1.2.5 Oxygen

Long-term oxygen therapy (LTOT)

1.2.5.1 Clinicians should be aware that inappropriate oxygen therapy in people with COPD may cause respiratory depression. [2004]

1.2.5.2 LTOT is indicated in patients with COPD who have a PaO₂ less than 7.3 kPa when stable or a PaO₂ greater than 7.3 and less than 8 kPa when stable and one of: secondary polycythaemia, nocturnal hypoxaemia (oxygen saturation of arterial blood [SaO₂] less than 90% for more than 30% of the time), peripheral oedema or pulmonary hypertension. [2004]

1.2.5.3 To get the benefits of LTOT patients should breathe supplemental oxygen for at least 15 hours per day. Greater benefits are seen in patients receiving oxygen for 20 hours per day. [2004]

1.2.5.4 The need for oxygen therapy should be assessed in:

- all patients with severe airflow obstruction (FEV₁ < 30% predicted)
- patients with cyanosis
- patients with polycythaemia
- patients with peripheral oedema
- patients with a raised jugular venous pressure
- patients with oxygen saturations ≤ 92% breathing air.

Assessment should also be considered in patients with moderate airflow obstruction (FEV₁ 30–49% predicted). [2004]

1.2.5.5 To ensure all patients eligible for LTOT are identified, pulse oximetry should be available in all healthcare settings. [2004]
1.2.5.6 The assessment of patients for LTOT should comprise the measurement of arterial blood gases on two occasions at least 3 weeks apart in patients who have a confident diagnosis of COPD, who are receiving optimum medical management and whose COPD is stable. [2004]

1.2.5.7 Patients receiving LTOT should be reviewed at least once per year by practitioners familiar with LTOT and this review should include pulse oximetry. [2004]

1.2.5.8 Oxygen concentrators should be used to provide the fixed supply at home for long-term oxygen therapy. [2004]

1.2.5.9 Patients should be warned about the risks of fire and explosion if they continue to smoke when prescribed oxygen. [2004]

Ambulatory oxygen therapy

1.2.5.10 People who are already on LTOT who wish to continue with oxygen therapy outside the home, and who are prepared to use it, should have ambulatory oxygen prescribed. [2004]

1.2.5.11 Ambulatory oxygen therapy should be considered in patients who have exercise desaturation, are shown to have an improvement in exercise capacity and/or dyspnoea with oxygen, and have the motivation to use oxygen. [2004]

1.2.5.12 Ambulatory oxygen therapy is not recommended in COPD if PaO₂ is greater than 7.3 kPa and there is no exercise desaturation. [2004]

1.2.5.13 Ambulatory oxygen therapy should only be prescribed after an appropriate assessment has been performed by a specialist. The purpose of the assessment is to assess the extent of desaturation, and the improvement in exercise capacity with supplemental oxygen, and the oxygen flow rate required to correct desaturation, aiming to keep the SaO₂ above 90%. [2004]
1.2.5.14 Small light-weight cylinders, oxygen-conserving devices and portable liquid oxygen systems should be available for the treatment of patients with COPD. [2004]

1.2.5.15 A choice about the nature of equipment prescribed should take account of the hours of ambulatory oxygen use required by the patient and the oxygen flow rate required (see Table 6). [2004]

Table 6 Appropriate equipment for ambulatory oxygen therapy

<table>
<thead>
<tr>
<th>Usage</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>For a duration of use of less than 90 minutes</td>
<td>Small cylinder</td>
</tr>
<tr>
<td>For a duration of use of less than 4 hours but more than 90 min</td>
<td>Small cylinder with oxygen conserving device</td>
</tr>
<tr>
<td>For duration of use of more than 4 hours</td>
<td>Liquid oxygen</td>
</tr>
<tr>
<td>For flow rates greater than 2 l/min and duration of use of more than 30 min</td>
<td>Liquid oxygen</td>
</tr>
</tbody>
</table>

Short-burst oxygen therapy

1.2.5.16 Short-burst oxygen therapy should only be considered for episodes of severe breathlessness in patients with COPD not relieved by other treatments. [2004]

1.2.5.17 Short-burst oxygen therapy should only continue to be prescribed if an improvement in breathlessness following therapy has been documented. [2004]

1.2.5.18 When indicated, short-burst oxygen should be provided from cylinders. [2004]

1.2.6 Non-invasive ventilation

1.2.6.1 Adequately treated patients with chronic hypercapnic ventilatory failure who have required assisted ventilation (whether invasive or non-invasive) during an exacerbation or who are hypercapnic or acidotic on LTOT should be referred to a specialist centre for consideration of long-term NIV. [2004]
### 1.2.7 Management of pulmonary hypertension and cor pulmonale

In the context of this guideline, the term ‘cor pulmonale’ has been adopted to define a clinical condition that is identified and managed on the basis of clinical features. This clinical syndrome of cor pulmonale includes patients who have right heart failure secondary to lung disease and those in whom the primary pathology is retention of salt and water, leading to the development of peripheral oedema.

#### Diagnosis of pulmonary hypertension and cor pulmonale

1.2.7.1 A diagnosis of cor pulmonale should be considered if patients have:

- peripheral oedema
- a raised venous pressure
- a systolic parasternal heave
- a loud pulmonary second heart sound. [2004]

1.2.7.2 It is recommended that the diagnosis of cor pulmonale is made clinically and that this process should involve excluding other causes of peripheral oedema. [2004]

#### Treatment of cor pulmonale

1.2.7.3 Patients presenting with cor pulmonale should be assessed for the need for long-term oxygen therapy. [2004]

1.2.7.4 Oedema associated with cor pulmonale can usually be controlled symptomatically with diuretic therapy. [2004]

1.2.7.5 The following are not recommended for the treatment of cor pulmonale:

- angiotensin-converting enzyme inhibitors
- calcium channel blockers
- alpha-blockers
- digoxin (unless there is atrial fibrillation). [2004]
1.2.8 Pulmonary rehabilitation

Pulmonary rehabilitation is defined as a multidisciplinary programme of care for patients with chronic respiratory impairment that is individually tailored and designed to optimise each patient’s physical and social performance and autonomy.

1.2.8.1 Pulmonary rehabilitation should be made available to all appropriate patients with COPD including those who have had a recent hospitalisation for an acute exacerbation. [new 2010]

1.2.8.2 Pulmonary rehabilitation should be offered to all patients who consider themselves functionally disabled by COPD (usually MRC grade 3 and above). Pulmonary rehabilitation is not suitable for patients who are unable to walk, have unstable angina or who have had a recent myocardial infarction. [2004]

1.2.8.3 For pulmonary rehabilitation programmes to be effective, and to improve concordance, they should be held at times that suit patients, and in buildings that are easy for patients to get to and have good access for people with disabilities. Places should be available within a reasonable time of referral. [2004]

1.2.8.4 Pulmonary rehabilitation programmes should include multicomponent, multidisciplinary interventions, which are tailored to the individual patient’s needs. The rehabilitation process should incorporate a programme of physical training, disease education, nutritional, psychological and behavioural intervention. [2004]

1.2.8.5 Patients should be made aware of the benefits of pulmonary rehabilitation and the commitment required to gain these. [2004]
1.2.9 "Vaccination and anti-viral therapy"

1.2.9.1 Pneumococcal vaccination and an annual influenza vaccination should be offered to all patients with COPD as recommended by the Chief Medical Officer\(^9\). [2004]

1.2.10 "Lung surgery"

1.2.10.1 Patients who are breathless, and have a single large bulla on a CT scan and an FEV\(_1\) less than 50% predicted should be referred for consideration of bullectomy. [2004]

1.2.10.2 Patients with severe COPD who remain breathless with marked restrictions of their activities of daily living, despite maximal medical therapy (including rehabilitation), should be referred for consideration of lung volume reduction surgery if they meet all of the following criteria:

- FEV\(_1\) more than 20% predicted
- PaCO\(_2\) less than 7.3 kPa
- upper lobe predominant emphysema
- TLCO more than 20% predicted. [2004]

1.2.10.3 Patients with severe COPD who remain breathless with marked restrictions of their activities of daily living despite maximal medical therapy should be considered for referral for assessment for lung transplantation bearing in mind comorbidities and local surgical protocols. Considerations include:

- age
- FEV\(_1\)
- PaCO\(_2\)
- homogeneously distributed emphysema on CT scan

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\(^9\) See also ‘Oseltamivir, amantadine (review) and zanamivir for the prophylaxis of influenza’ (NICE technology appraisal guidance 158) and ‘Amantadine, oseltamivir and zanamivir for the treatment of influenza’ (NICE technology appraisal guidance 168). Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
- elevated pulmonary artery pressures with progressive deterioration. [2004]

1.2.11 **Alpha-1 antitrypsin replacement therapy**

1.2.11.1 Alpha-1 antitrypsin replacement therapy is not recommended in the management of patients with alpha-1 antitrypsin deficiency (see also recommendation 1.1.3.3). [2004]

1.2.12 **Multidisciplinary management**

Many of these activities may be undertaken in the clinic or in the practice as part of routine care by the practitioner seeing the patient but in certain circumstances the patient may need to be referred to a specialist department e.g. physiotherapy. Multi-disciplinary working is breaking down historic demarcation of roles and many of the activities in managing COPD can be undertaken by individuals from different professional backgrounds. Competencies are more important than professional boundaries.

1.2.12.1 COPD care should be delivered by a multidisciplinary team. [2004]

1.2.12.2 The following functions should be considered when defining the activity of the multidisciplinary team:

- assessing patients (including performing spirometry, assessing the need for oxygen, the need for aids for daily living and the appropriateness of delivery systems for inhaled therapy)
- managing patients (including non-invasive ventilation, pulmonary rehabilitation, hospital-at-home/early discharge schemes, providing palliative care, identifying and managing anxiety and depression, advising patients on relaxation techniques, dietary issues, exercise, social security benefits and travel)
- advising patients on self-management strategies
- identifying and monitoring patients at high risk of exacerbations and undertaking activities which aim to avoid emergency admissions
• advising patients on exercise
• education of patients and other health professionals. [2004]

Respiratory nurse specialists
1.2.12.3 It is recommended that respiratory nurse specialists form part of the multidisciplinary COPD team. [2004]

Physiotherapy
1.2.12.4 If patients have excessive sputum, they should be taught:

• the use of Positive Expiratory Pressure masks
• active cycle of breathing techniques. [2004]

Identifying and managing anxiety and depression
1.2.12.5 Healthcare professionals should be alert to the presence of depression in patients with COPD. The presence of anxiety and depression should be considered in patients:

• who are hypoxic (SaO2 less than 92%)
• who have severe dyspnoea
• who have been seen at or admitted to a hospital with an exacerbation of COPD10. [2004]

1.2.12.6 The presence of anxiety and depression in patients with COPD can be identified using validated assessment tools. [2004]

1.2.12.7 Patients found to be depressed or anxious should be treated with conventional pharmacotherapy. [2004]

1.2.12.8 For antidepressant treatment to be successful, it needs to be supplemented by spending time with the patient explaining why depression needs to be treated alongside the physical disorder. [2004]

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10 See also ‘Depression in adults with a chronic physical health problem: Treatment and management’ (NICE clinical guideline 91) Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
Nutritional factors

1.2.12.9 BMI should be calculated in patients with COPD:

- the normal range for BMI is 20 to less than 25
- if the BMI is abnormal (high or low), or changing over time, the patient should be referred for dietetic advice
- if the BMI is low patients should also be given nutritional supplements to increase their total calorific intake and be encouraged to take exercise to augment the effects of nutritional supplementation.

Refer to ‘Nutrition support in adults’ (NICE clinical guideline 32). [2004]

1.2.12.10 In older patients attention should also be paid to changes in weight, particularly if the change is more than 3 kg. [2004]

Palliative care

1.2.12.11 Opioids should be used when appropriate to palliate breathlessness in patients with end-stage COPD which is unresponsive to other medical therapy. [2004]

1.2.12.12 Benzodiazepines, tricyclic antidepressants, major tranquillisers and oxygen should also be used when appropriate for breathlessness in patients with end-stage COPD unresponsive to other medical therapy. [2004]

1.2.12.13 Patients with end-stage COPD and their family and carers should have access to the full range of services offered by multidisciplinary palliative care teams, including admission to hospices. [2004]

Assessment for occupational therapy

1.2.12.14 Patients should be regularly asked about their ability to undertake activities of daily living and how breathless they become when doing these. [2004]
1.2.12.15 Clinicians managing patients with COPD should assess their need for occupational therapy using validated tools. [2004]

Social services
1.2.12.16 Patients disabled by COPD should be considered for referral for assessment by a social services department. [2004]

Advice on travel
1.2.12.17 All patients on LTOT planning air travel should be assessed in line with the BTS recommendations. [2004]

1.2.12.18 All patients with an FEV₁ < 50% predicted who are planning air travel should be assessed in line with the BTS recommendations. [2004]

1.2.12.19 All patients known to have bullous disease should be warned that they are at a theoretically increased risk of developing a pneumothorax during air travel. [2004]

Advice on diving
1.2.12.20 Scuba diving is not recommended for patients with COPD. [2004]

Education
1.2.12.21 There are significant differences in the response of patients with COPD and asthma to education programmes. Programmes designed for asthma should not be used in COPD. [2004]

1.2.12.22 Specific educational packages should be developed for patients with COPD.

- Suggested topics for inclusion are listed in Appendix C of the full guideline (see Section 5 for details of the full guideline).
- The packages should take account of the different needs of patients at different stages of their disease. [2004]

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Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
1.2.12.23 Patients with moderate and severe COPD should be made aware of the technique of NIV. Its benefits and limitations should be explained so that if it is ever necessary in the future they will be aware of these issues (see section 1.3.7). [2004]

Self-management

1.2.12.24 Patients at risk of having an exacerbation of COPD should be given self-management advice that encourages them to respond promptly to the symptoms of an exacerbation. [2004]

1.2.12.25 Patients should be encouraged to respond promptly to the symptoms of an exacerbation by:

- starting oral corticosteroid therapy if their increased breathlessness interferes with activities of daily living (unless contraindicated)
- starting antibiotic therapy if their sputum is purulent
- adjusting their bronchodilator therapy to control their symptoms. [2004]

1.2.12.26 Patients at risk of having an exacerbation of COPD should be given a course of antibiotic and corticosteroid tablets to keep at home for use as part of a self-management strategy (see recommendation 1.3.5.9). [2004]

1.2.12.27 The appropriate use of these tablets should be monitored. [2004]

1.2.12.28 Patients given self-management plans should be advised to contact a healthcare professional if they do not improve. [2004]

1.2.13 Fitness for general surgery

1.2.13.1 The ultimate clinical decision about whether or not to proceed with surgery should rest with a consultant anaesthetist and consultant surgeon taking account of the presence of comorbidities, the
1.2.13.2 It is recommended that lung function should not be the only criterion used to assess patients with COPD before surgery. Composite assessment tools such as the ASA scoring system are the best predictors of risk. \[2004\]

1.2.13.3 If time permits, the medical management of the patient should be optimised prior to surgery and this might include undertaking a course of pulmonary rehabilitation. \[2004\]

1.2.14 Follow up of patients with COPD

1.2.14.1 Follow up of all patients with COPD should include:

- highlighting the diagnosis of COPD in the case record and recording this using Read codes on a computer database
- recording the values of spirometric tests performed at diagnosis (both absolute and percent predicted)
- offering smoking cessation advice
- recording the opportunistic measurement of spirometric parameters (a loss of 500 ml or more over 5 years will select out those patients with rapidly progressing disease who may need specialist referral and investigation). \[2004\]

1.2.14.2 Patients with mild or moderate COPD should be reviewed at least once per year, or more frequently if indicated, and the review should cover the issues listed in Table 7. \[2004\]

1.2.14.3 For most patients with stable severe disease regular hospital review is not necessary, but there should be locally agreed mechanisms to allow rapid access to hospital assessment when necessary. \[2004\]
1.2.14.4 When patients with severe COPD are reviewed in primary care, they should be seen at least twice a year, and specific attention should be paid to the issues listed in Table 7. [2004]

1.2.14.5 Patients with severe disease requiring interventions such as long-term non-invasive ventilation should be reviewed regularly by specialists. [2004]

### Table 7 Summary of follow up of patients with COPD in primary care

<table>
<thead>
<tr>
<th></th>
<th>Mild/moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency</strong></td>
<td>At least annual</td>
<td>At least twice per year</td>
</tr>
</tbody>
</table>
| **Clinical assessment** | • Smoking status and desire to quit  
• Adequacy of symptom control:  
  – breathlessness  
  – exercise tolerance  
  – estimated exacerbation frequency  
• Presence of complications  
• Effects of each drug treatment  
• Inhaler technique  
• Need for referral to specialist and therapy services  
• Need for pulmonary rehabilitation | • Smoking status and desire to quit  
• Adequacy of symptom control:  
  – breathlessness  
  – exercise tolerance  
  – estimated exacerbation frequency  
• Presence of cor pulmonale  
• Need for long-term oxygen therapy  
• Patient’s nutritional state  
• Presence of depression  
• Effects of each drug treatment  
• Inhaler technique  
• Need for social services and occupational therapy input  
• Need for referral to specialist and therapy services  
• Need for pulmonary rehabilitation |
| **Measurements to make** | • FEV₁ and FVC  
• calculate BMI  
• MRC dyspnoea score | • FEV₁ and FVC  
• calculate BMI  
• MRC dyspnoea score  
• SaO₂ |
1.3 Management of exacerbations of COPD

1.3.1 Definition of an exacerbation

An exacerbation is a sustained worsening of the patient’s symptoms from their usual stable state which is beyond normal day-to-day variations, and is acute in onset. Commonly reported symptoms are worsening breathlessness, cough, increased sputum production and change in sputum colour. The change in these symptoms often necessitates a change in medication.

1.3.2 Assessment of need for hospital treatment

1.3.2.1 Factors that should be used to assess the need to treat patients in hospital are listed in Table 8. [2004]

Table 8 Factors to consider when deciding where to treat the patient

<table>
<thead>
<tr>
<th>Factor</th>
<th>Treat at home</th>
<th>Treat in hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to cope at home</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>Mild</td>
<td>Severe</td>
</tr>
<tr>
<td>General condition</td>
<td>Good</td>
<td>Poor/deteriorating</td>
</tr>
<tr>
<td>Level of activity</td>
<td>Good</td>
<td>Poor/confined to bed</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Worsening peripheral oedema</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Level of consciousness</td>
<td>Normal</td>
<td>Impaired</td>
</tr>
<tr>
<td>Already receiving LTOT</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Social circumstances</td>
<td>Good</td>
<td>Living alone/not coping</td>
</tr>
<tr>
<td>Acute confusion</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rapid rate of onset</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Significant comorbidity</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>(particularly cardiac disease and insulin-dependent diabetes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changes on chest radiograph</td>
<td>No</td>
<td>Present</td>
</tr>
<tr>
<td>Arterial pH level</td>
<td>$\geq 7.35$</td>
<td>$&lt; 7.35$</td>
</tr>
<tr>
<td>Arterial $\text{PaO}_2$</td>
<td>$\geq 7$ kPa</td>
<td>$&lt; 7$ kPa</td>
</tr>
</tbody>
</table>

1.3.3 Investigation of an exacerbation

The diagnosis of an exacerbation is made clinically and does not depend on the results of investigations; however, in certain situations, investigations may assist in ensuring appropriate treatment is given. Different investigation
strategies are required for patients managed in hospital (who will tend to have more severe exacerbations) and those managed in the community.

Primary care

1.3.3.1 In patients with an exacerbation managed in primary care:

- sending sputum samples for culture is not recommended in routine practice
- pulse oximetry is of value if there are clinical features of a severe exacerbation. [2004]

Patients referred to hospital

1.3.3.2 In all patients with an exacerbation referred to hospital:

- a chest radiograph should be obtained
- arterial blood gas tensions should be measured and the inspired oxygen concentration should be recorded
- an ECG should be recorded (to exclude comorbidities)
- a full blood count should be performed and urea and electrolyte concentrations should be measured
- a theophylline level should be measured in patients on theophylline therapy at admission
- if sputum is purulent, a sample should be sent for microscopy and culture
- blood cultures should be taken if the patient is pyrexial. [2004]

1.3.4 Hospital-at-home and assisted-discharge schemes

1.3.4.1 Hospital-at-home and assisted-discharge schemes are safe and effective and should be used as an alternative way of managing patients with exacerbations of COPD who would otherwise need to be admitted or stay in hospital. [2004]

1.3.4.2 The multi-professional team required to operate these schemes should include allied health professionals with experience in managing patients with COPD, and may include nurses,
There are currently insufficient data to make firm recommendations about which patients with an exacerbation are most suitable for hospital-at-home or early discharge. Patient selection should depend on the resources available and absence of factors associated with a worse prognosis, for example, acidosis. [2004]

1.3.4.4 Patient’s preferences about treatment at home or in hospital should be considered. [2004]

### 1.3.5 Pharmacological management

Increased breathlessness is a common feature of an exacerbation of COPD. This is usually managed by taking increased doses of short-acting bronchodilators.

**Delivery systems for inhaled therapy during exacerbations**

1.3.5.1 Both nebulisers and hand-held inhalers can be used to administer inhaled therapy during exacerbations of COPD. [2004]

1.3.5.2 The choice of delivery system should reflect the dose of drug required, the ability of the patient to use the device and the resources available to supervise the administration of the therapy. [2004]

1.3.5.3 Patients should be changed to hand-held inhalers as soon as their condition has stabilised because this may permit earlier discharge from hospital. [2004]

1.3.5.4 If a patient is hypercapnic or acidotic the nebuliser should be driven by compressed air, not oxygen (to avoid worsening hypercapnia). If oxygen therapy is needed it should be administered simultaneously by nasal cannulae. [2004]
1.3.5.5 The driving gas for nebulised therapy should always be specified in the prescription. [2004]

**Systemic corticosteroids**

1.3.5.6 In the absence of significant contraindications oral corticosteroids should be used, in conjunction with other therapies, in all patients admitted to hospital with an exacerbation of COPD. [2004]

1.3.5.7 In the absence of significant contraindications, oral corticosteroids should be considered in patients managed in the community who have an exacerbation with a significant increase in breathlessness which interferes with daily activities. [2004]

1.3.5.8 Patients requiring corticosteroid therapy should be encouraged to present early to get maximum benefits (see recommendations 1.2.12.24–28). [2004]

1.3.5.9 Prednisolone 30 mg orally should be prescribed for 7 to 14 days. [2004]

1.3.5.10 It is recommended that a course of corticosteroid treatment should not be longer than 14 days as there is no advantage in prolonged therapy. [2004]

1.3.5.11 For guidance on stopping oral corticosteroid therapy it is recommended that clinicians refer to the British National Formulary section 6.3.2. [2004]

1.3.5.12 Osteoporosis prophylaxis should be considered in patients requiring frequent courses of oral corticosteroids. [2004]

1.3.5.13 Patients should be made aware of the optimum duration of treatment and the adverse effects of prolonged therapy. [2004]

1.3.5.14 Patients, particularly those discharged from hospital, should be given clear instructions about why, when and how to stop their corticosteroid treatment. [2004]
### Antibiotics

1.3.5.15 Antibiotics should be used to treat exacerbations of COPD associated with a history of more purulent sputum. [2004]

1.3.5.16 Patients with exacerbations without more purulent sputum do not need antibiotic therapy unless there is consolidation on a chest radiograph or clinical signs of pneumonia. [2004]

1.3.5.17 Initial empirical treatment should be an aminopenicillin, a macrolide, or a tetracycline. When initiating empirical antibiotic treatment prescribers should always take account of any guidance issued by their local microbiologists. [2004]

1.3.5.18 When sputum has been sent for culture, the appropriateness of antibiotic treatment should be checked against laboratory culture and sensitivities when they become available. [2004]

### Theophylline and other methylxanthines

1.3.5.19 Intravenous theophylline should only be used as an adjunct to the management of exacerbations of COPD if there is an inadequate response to nebulised bronchodilators. [2004]

1.3.5.20 Care should be taken when using intravenous theophylline because of interactions with other drugs and potential toxicity if the patient has been on oral theophylline. [2004]

1.3.5.21 Theophylline levels should be monitored within 24 hours of starting treatment and subsequently as frequently as indicated by the clinical circumstances. [2004]

### Respiratory stimulants

1.3.5.22 It is recommended that doxapram is used only when non-invasive ventilation is either unavailable or considered inappropriate. [2004]
1.3.6 Oxygen therapy during exacerbations of COPD

1.3.6.1 The oxygen saturation should be measured in patients with an exacerbation of COPD, if there are no facilities to measure arterial blood gases. [2004]

1.3.6.2 If necessary, oxygen should be given to keep the SaO2 greater than 90%. [2004]

1.3.6.3 Pulse oximeters should be available to all healthcare professionals managing patients with exacerbations of COPD and they should be trained in their use. Clinicians should be aware that pulse oximetry gives no information about the PCO2 or pH. [2004]

1.3.6.4 In the interim period while the recommendation on the availability of oximeters is implemented, oxygen should be given to all patients with an exacerbation of COPD who are breathless, if the oxygen saturations are not known. [2004]

1.3.6.5 During the transfer to hospital the following points should be considered.

- It is not desirable to exceed an oxygen saturation of 93%. Oxygen therapy should be commenced at approximately 40% and titrated upwards if saturation falls below 90% and downwards if the patient becomes drowsy or if the saturation exceeds 93–94%.
- Patients with known type II respiratory failure need special care, especially if they require a long ambulance journey or if they are given oxygen at home for a prolonged period before the ambulance arrives. [2004]

1.3.6.6 When the patient arrives at hospital, arterial blood gases should be measured and the inspired oxygen concentration noted in all patients with an exacerbation of COPD. Arterial blood gas
measurements should be repeated regularly, according to the response to treatment. [2004]

1.3.6.7 The aim of supplemental oxygen therapy in exacerbations of COPD is to maintain adequate levels of oxygenation (SaO₂ > 90%), without precipitating respiratory acidosis or worsening hypercapnia. Patients with pH < 7.35 should be considered for ventilatory support. [2004]

1.3.7 Non-invasive ventilation and COPD exacerbations

1.3.7.1 NIV should be used as the treatment of choice for persistent hypercapnic ventilatory failure during exacerbations despite optimal medical therapy. [2004]

1.3.7.2 It is recommended that NIV should be delivered in a dedicated setting with staff who have been trained in its application, who are experienced in its use and who are aware of its limitations. [2004]

1.3.7.3 When patients are started on NIV there should be a clear plan covering what to do in the event of deterioration and ceilings of therapy should be agreed. [2004]

1.3.8 Invasive ventilation and intensive care

1.3.8.1 Patients with exacerbations of COPD should receive treatment on intensive care units, including invasive ventilation when this is thought to be necessary. [2004]

1.3.8.2 During exacerbations of COPD, functional status, BMI, requirement for oxygen when stable, comorbidities and previous admissions to intensive care units should be considered, in addition to age and FEV₁, when assessing suitability for intubation and ventilation. Neither age nor FEV₁ should be used in isolation when assessing suitability. [2004]
1.3.8.3 NIV should be considered for patients who are slow to wean from invasive ventilation. [2004]

1.3.9 Respiratory physiotherapy and exacerbations
1.3.9.1 Physiotherapy using positive expiratory pressure masks should be considered for selected patients with exacerbations of COPD, to help with clearing sputum. [2004]

1.3.10 Monitoring recovery from an exacerbation
1.3.10.1 Patients’ recovery should be monitored by regular clinical assessment of their symptoms and observation of their functional capacity. [2004]

1.3.10.2 Pulse oximetry should be used to monitor the recovery of patients with non-hypercapnic, non-acidotic respiratory failure. [2004]

1.3.10.3 Intermittent arterial blood gas measurements should be used to monitor the recovery of patients with respiratory failure who are hypercapnic or acidotic, until they are stable. [2004]

1.3.10.4 Daily monitoring of PEF or FEV\textsubscript{1} should not be performed routinely to monitor recovery from an exacerbation because the magnitude of changes is small compared with the variability of the measurement. [2004]

1.3.11 Discharge planning
1.3.11.1 Spirometry should be measured in all patients before discharge. [2004]

1.3.11.2 Patients should be re-established on their optimal maintenance bronchodilator therapy before discharge. [2004]

1.3.11.3 Patients who have had an episode of respiratory failure should have satisfactory oximetry or arterial blood gas results before discharge. [2004]
<table>
<thead>
<tr>
<th>Section</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3.11.4</td>
<td>All aspects of the routine care that patients receive (including appropriateness and risk of side effects) should be assessed before discharge. [2004]</td>
</tr>
<tr>
<td>1.3.11.5</td>
<td>Patients (or home carers) should be given appropriate information to enable them to fully understand the correct use of medications, including oxygen, before discharge. [2004]</td>
</tr>
<tr>
<td>1.3.11.6</td>
<td>Arrangements for follow-up and home care (such as visiting nurse, oxygen delivery, referral for other support) should be made before discharge. [2004]</td>
</tr>
<tr>
<td>1.3.11.7</td>
<td>Before the patient is discharged, the patient, family and physician should be confident that he or she can manage successfully. When there is remaining doubt a formal activities of daily living assessment may be helpful. [2004]</td>
</tr>
</tbody>
</table>
2 Notes on the scope of the guidance

NICE guidelines are developed in accordance with a scope document that defines what the guideline will and will not cover. The scope of this guideline is available from

www.nice.org.uk/nicemedia/pdf/COPDFinalScope050109.pdf

The guideline offers best practice advice on the care of adults who have a clinical working diagnosis of COPD including chronic bronchitis, emphysema, and chronic airflow limitation/obstruction. The guideline is relevant to primary and secondary healthcare professionals who have direct contact with patients with COPD, and make decisions about their care.

The guideline covers diagnostic criteria and identification of early disease. The guideline also makes recommendations on the management of people with stable COPD, exacerbations and preventing progression of the disease.

The guideline does not cover the management of people with asthma, bronchopulmonary dysplasia and bronchiectasis, nor does it cover children.

How this guideline was developed

NICE commissioned the National Clinical Guideline Centre for Acute and Chronic Conditions to develop this guideline update. The Centre established a guideline development group (see appendix A), which reviewed the evidence and developed the recommendations. An independent guideline review panel oversaw the development of the guideline (see appendix B).

There is more information about how NICE clinical guidelines are developed on the NICE website (www.nice.org.uk/guidelinesprocess). A booklet, ‘How NICE clinical guidelines are developed: an overview for stakeholders, the public and the NHS’ (fourth edition, published 2009), is available from NICE publications (phone 0845 003 7783 or email publications@nice.org.uk and quote reference N1739).
3 Implementation

NICE has developed tools to help organisations implement this guidance (see www.nice.org.uk/CGXX).

4 Research recommendations

The Guideline Development Group has made the following recommendations for research, based on its review of evidence, to improve NICE guidance and patient care in the future.

4.1 Pulmonary rehabilitation during hospital admission

In people with COPD, does pulmonary rehabilitation during hospital admission for exacerbation and/or in the early recovery period (within 1 month of an exacerbation) improve quality of life and reduce hospitalisations and exacerbations compared to a later (defined as after 1 month) pulmonary rehabilitation programme?

Why this is important

The greatest reconditioning and potential benefit from rehabilitation may occur in the early post-exacerbation phase. If inpatient pulmonary rehabilitation is demonstrated to be effective this may potentially impact upon service delivery (for example, early discharge schemes). The cost effectiveness of early versus later pulmonary rehabilitation programmes should also be evaluated. Studies should cluster randomised, be of sufficiently long duration and adequately powered.

4.2 Multidimensional assessment of outcomes

Could a simple multi-dimensional assessment be used to give a better indication of COPD outcomes than either FEV1 or other components measure alone in a wide range of COPD patients, and applicable in a primary care setting?
**Why this is important**
The BODE index assessment is time-consuming and impractical in a primary care setting. The GDG considered that people entering COPD studies should be characterised by the BODE index to assess whether it has an effect on outcome. Multi-dimensional assessments should be validated in a general UK COPD population, and in a primary care setting, in a wider range of outcomes than mortality. Any multi-dimensional assessment index would need to be subjected to health economic evaluation. All clinical studies of sufficiently long duration should routinely include health economic evaluation.

### 4.3 Triple therapy

In people with COPD does triple therapy improve outcomes when compared with single or double therapy?

**Why this is important**
Currently available studies were not designed or powered to assess whether people with mild COPD on single therapy with LABA or LAMA or double therapy with LABA+ICS might benefit from triple therapy. All clinical studies of sufficiently long duration should routinely include health economic evaluation.

### 4.4 Mucolytic therapy

In people with COPD, does mucolytic drug therapy prevent exacerbations in comparison to placebo and other therapies?

**Why this is important**
People with COPD should have a definitive diagnosis of COPD. Baseline severity and clinical phenotype should be well defined. Concomitant therapies should be stratified in the study design. Comparisons should be made with other effective therapies as well as placebo.
5 Other versions of this guideline

5.1 Full guideline

The full guideline, 'Chronic Obstructive Pulmonary Disease: Management of adults with chronic obstructive pulmonary disease in primary and secondary care', contains details of the methods and evidence used to develop the guideline. It is published by the National Clinical Guideline Centre for Acute and Chronic Conditions, and is available from www.rcplondon.ac.uk/clinical-standards/ncgc/Pages/overview.aspx and our website (www.nice.org.uk/CGXXfullguideline). [Note: these details will apply to the published full guideline.]

5.2 Quick reference guide

A quick reference guide for healthcare professionals is available from www.nice.org.uk/CGXXquickrefguide

For printed copies, phone NICE publications on 0845 003 7783 or email publications@nice.org.uk (quote reference number N1XXX). [Note: these details will apply when the guideline is published.]

5.3 ‘Understanding NICE guidance’

A summary for patients and carers (‘Understanding NICE guidance’) is available from www.nice.org.uk/CGXXpublicinfo

For printed copies, phone NICE publications on 0845 003 7783 or email publications@nice.org.uk (quote reference number N1XXX). [Note: these details will apply when the guideline is published.]

We encourage NHS and voluntary sector organisations to use text from this booklet in their own information about [condition].
6 Related NICE guidance

Published

- Smoking cessation services in primary care, pharmacies, local authorities and workplaces, particularly for manual working groups, pregnant women and hard to reach communities. NICE public health guidance 10 (2008). Available from: www.nice.org.uk/PH10

7 Updating the guideline

NICE clinical guidelines are updated so that recommendations take into account important new information. New evidence is checked 3 years after publication, and healthcare professionals and patients are asked for their views; we use this information to decide whether all or part of a guideline...
needs updating. If important new evidence is published at other times, we may decide to do a more rapid update of some recommendations.
Appendix A: The Guideline Development Group

2010 guideline update development group members

Dr Michael Rudolf (Chair)
Respiratory Physician, Ealing Hospital NHS Trust

Dr John O'Reilly (Clinical Advisor)
Consultant in General and Respiratory Medicine, University Hospital Aintree NHS Trust

Ms Nicola Sloan
Research Fellow, NCGC until March 2009

Dr Emily Crowe
Senior Research Fellow, NCGC

Dr Rachel O'Mahony
Senior Research Fellow, NCGC from March 2009

Ms Kate Lovibond
Health Economist, NCGC

Ms Lina Bakhshi
Senior Information Scientist, NCGC

Mr John Morris
Project Manager, NCGC until May 2009

Mrs Margaret Barnard
Patient/carer representative, Secretary of Breath Easy

Ms Katherine Leach
Patient/carer representative, Project Manager at British Lung Foundation

Dr Kevin Grufydd-Jones
General Practitioner (specialist in COPD), Principal in General Practice, Wiltshire

Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
Ms Erica Haines
Primary Care Nurse, (acted as a deputy for Christine Loveridge for one GDG meeting)

Ms Barbara Foggo
Respiratory Nurse, (acted as a deputy for Karen Heslop), Freeman Hospital, Newcastle

2004 clinical guideline 12 development group members

Dr David MG Halpin* (Lead and Clinical Advisor)
Consultant Physician and Senior Lecturer, Royal Devon & Exeter Hospital

Ms Jill Parnham*
Senior Health Services Research Fellow in Guideline Development, National Collaborating Centre for Chronic Conditions

Dr David Bellamy*
General Practitioner, Bournemouth

Ms Julie Booker*
Respiratory Nurse Specialist, Rotherham General Hospital

Professor Peter Calverley* (seconded from the Consensus Reference Group for three meetings)
Professor of Respiratory Medicine, University of Liverpool and Aintree Hospital NHS Trust

Dr Martin Connolly*
Consultant Geriatrician, University of Manchester

Dr Rachel Garrod*
Senior Lecturer, Kingston University

Mr Ashley Green* (deputy for Esther Threlfall)
Breathe Easy Assistant Manager, British Lung Foundation

Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
Ms Gwen Haylett*  
Patient Representative

Dr Michael ML Morgan* (seconded from the Consensus Reference Group for one meeting)  
Consultant Physician, University Hospitals of Leicester NHS Trust

Ms Karen Reid*  
Information Scientist, National Collaborating Centre for Chronic Conditions

Dr Michael Rudolf*  
Consultant Physician, Ealing Hospital NHS Trust

Ms Katherine Stevens*  
Research Associate in Health Economics, School of Health and Related Research, University of Sheffield

Esther Threlfall*  
UK Breathe Easy Manager, British Lung Foundation

Ms Jane Scullion* (attended two meetings as deputy for Julie Booker)  
Respiratory Consultant Nurse, University Hospital of Leicester

Ms Teresa Smith (attended five meetings as deputy for Julie Booker)  
Senior Respiratory Nurse/Chest Clinic Manager, Heatherwood and Wexham Park NHS Trust

Ms Elaine Stevenson (attended one meeting as deputy for Julie Booker)  
Clinical Practitioner Respiratory Care, Southern Derbyshire Acute Hospitals Trust

Professor Jadwiga Wedzicha*  
Professor of Respiratory Medicine, St Bartholomew's and the Royal London School of Medicine

Consensus Reference Group  
To support the development of this guideline, a Consensus Reference Group was formed. This group used formal consensus techniques in its Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
consideration of clinically important areas where there was insufficient evidence or disagreement over the interpretation of the evidence.

**Professor Duncan Geddes (Chair)**
Professor of Respiratory Medicine, Royal Brompton Hospital NHS Trust

**Ms Alison Bent (attended one meeting as deputy for Mary Hickson)**
Dietitian, Hammersmith Hospitals NHS Trust

**Professor Peter Calverley**
Professor of Respiratory Medicine, University of Liverpool and Aintree Hospital NHS Trust

**Dr Stephen Connellan**
Consultant Physician, The Royal Wolverhampton Hospitals NHS Trust

**Dr Sujal Desai (attended one meeting)**
Radiologist, King's College Hospital

*Denotes member of both the Guideline Development Group and the Consensus Reference Group*
Appendix B: The Guideline Review Panel

The Guideline Review Panel is an independent panel that oversees the development of the guideline and takes responsibility for monitoring adherence to NICE guideline development processes. In particular, the panel ensures that stakeholder comments have been adequately considered and responded to. The panel includes members from the following perspectives: primary care, secondary care, lay, public health and industry.

2010 guideline update Guideline Review Panel

Dr John Hyslop (Chair)
Secondary Care rep Consultant Radiologist Royal Cornwall Hospital NHS Trust

Dr Ash Paul
Medical Director, Bedfordshire Primary Care Trust

Mr Jon Hopper
Medical Director (Northern Europe), ConvaTec Ltd

Professor Liam Smeeth
Professor of Clinical Epidemiology, London School of Hygiene and Tropical Medicine

Mr Peter Gosling
Lay member

2004 clinical guideline 12 Guideline Review Panel

Dr Bernard Higgins (Chair)
Consultant Chest Physician, Freeman Hospital, Newcastle upon Tyne

Dr Robert Higgins
Consultant in Renal and General Medicine, University Hospitals Coventry and Warwickshire

Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
DRAFT FOR CONSULTATION

Dr Marcia Kelson
Director, Patient Involvement Unit for NICE, London

Dr Peter Rutherford
Senior Lecturer in Nephrology, Medical Director, University College of Wales College of Medicine

Dame Helena Shovelton
Chief Executive, British Lung Foundation

Fiona Wise
Acting Director of Modernisation, Bedfordshire and Hertfordshire Strategic Health Authority

Dr John Young
Medical Director, Merck Sharp and Dohme
Appendix C: The algorithms
**Algorithm 1: Diagnosing COPD**

The evidence for this algorithm has not been reviewed since 2004. Please do not comment on this algorithm as part of the update consultation.

**Definition of chronic obstructive pulmonary disease (COPD)**

COPD is characterised by airflow obstruction. The airflow obstruction is usually progressive, not fully reversible and does not change markedly over several months. The disease is predominantly caused by smoking.

### Think of the diagnosis of COPD for patients who are:
- over 35
- smokers or ex-smokers
- have any of these symptoms:
  - exertional breathlessness
  - chronic cough
  - regular sputum production
  - frequent winter ‘bronchitis’
  - wheeze
- and have no clinical features of asthma (see table below)

### Perform spirometry if COPD seems likely.

Airflow obstruction is defined as post-bronchodilator:
- FEV₁/FVC < 0.7
- And FEV₁ < 80% predicted

Spirometric reversibility testing is not usually necessary as part of the diagnostic process or to plan initial therapy.

### If still doubt about diagnosis consider the following pointers

- Clinically significant COPD is unlikely if FEV₁ and FEV₁/FVC ratio return to normal with drug therapy.
- Asthma may be present if:
  - there is a > 400 ml response to bronchodilators
  - serial peak flow measurements show significant diurnal or day-to-day variability
  - there is a > 400 ml response to 30mg prednisolone daily for 2 weeks
- Refer for more detailed investigations if needed (see page **)  

### If no doubt, diagnose COPD and start treatment

### Reassess Diagnosis in view of response to treatment

### Clinical features differentiating COPD and asthma

<table>
<thead>
<tr>
<th>Feature</th>
<th>COPD</th>
<th>Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoker or ex-smoker</td>
<td>Nearly all</td>
<td>Possibly</td>
</tr>
<tr>
<td>Symptoms under age 35</td>
<td>Rare</td>
<td>Often</td>
</tr>
<tr>
<td>Chronic productive cough</td>
<td>Common</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>Persistent and progressive</td>
<td>Variable</td>
</tr>
<tr>
<td>Night time waking with breathlessness and wheeze</td>
<td>Uncommon</td>
<td>Common</td>
</tr>
<tr>
<td>Significant diurnal or day to day variability of symptoms</td>
<td>Uncommon</td>
<td>Common</td>
</tr>
</tbody>
</table>
### Algorithm 2: Management of Stable COPD

Changes to this algorithm that have been made as part of the 2010 update are highlighted in yellow. We welcome your comments on these new aspects of the algorithm as part of the update consultation.

#### Patients with COPD

<table>
<thead>
<tr>
<th>Smoking</th>
<th>Breathlessness &amp; Exercise Limitation</th>
<th>Frequent Exacerbations</th>
<th>Respiratory Failure</th>
<th>Cor pulmonale</th>
<th>Abnormal BMI</th>
<th>Chronic Productive Cough</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Offer help to stop smoking at every opportunity</td>
<td>Deleted</td>
<td>• Offer annual influenza vaccination</td>
<td>• Offer for appropriate Oxygen:</td>
<td>• Assess need for oxygen</td>
<td>• Refer for dietetic advice</td>
<td>• Consider trial of mucolytic therapy</td>
</tr>
<tr>
<td>• Combine pharmacotherapy with appropriate support as part of a programme</td>
<td>Deleted in update</td>
<td>• Offer pneumococcal vaccination</td>
<td>- LTOT</td>
<td>• Use diuretics</td>
<td>• Give nutritional supplements if the BMI is low</td>
<td>• Continue if symptomatic improvement</td>
</tr>
<tr>
<td>Deleted in update</td>
<td></td>
<td>• Give self-management advice</td>
<td>- ambulatory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimize inhaled therapy using the algorithm (2a) below</td>
<td></td>
<td>• Optimise inhaled therapy using the algorithm (2a) below</td>
<td>• Consider referral for assessment for long-term domiciliary NIV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deleted in update</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If still symptomatic consider adding theophylline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer pulmonary rehabilitation to all patients who consider themselves functionally disabled (usually MRC grade 3 and above) including those who have had a recent hospitalisation for an exacerbation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consider referral for surgery: bullectomy, LVRS, transplantation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Palliative Care:** Opiates can be used for the palliation of breathlessness in patients with end stage COPD unresponsive to other medical therapy. Use benzodiazepines, tricyclic antidepressants, major tranquillisers and oxygen when appropriate. Involve multidisciplinary palliative care teams.
**Algorithm 2a: Use of inhaled therapies**

This new algorithm has been developed based on new evidence in the 2010 update. We welcome your comments on this algorithm as part of the update consultation.

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**COPD algorithm 2a for use of inhaled therapies**

**Breathlessness and exercise limitation**
- SABA OR SAMA as required*

---

**Exacerbations or persistent breathlessness**

- **FEV₁ ≥ 50%**
  - LABA
    - **LABA+ICS**
      - Consider LABA + LAMA if ICS declined or not tolerated
  - **LAMA**
    - Discontinue SAMA
      - Offer LAMA in preference to regular SAMA qds

- **FEV < 50%**
  - LABA+ICS
    - Consider LABA + LAMA if ICS declined or not tolerated
  - LAMA
    - Discontinue SAMA
  - **LABA + ICS**

---

* SABA (as required) may continue at all stages

---

Offer therapy ---- Consider therapy
Algorithm 3: Managing Exacerbations of COPD

The evidence for this algorithm has not been reviewed since 2004. Please do not comment on this algorithm as part of the update consultation.

Exacerbations of COPD can be associated with increased dyspnoea / sputum purulence /

Initial management
- Increase frequency of bronchodilator use – consider giving via a nebuliser
- Oral antibiotics if purulent sputum
- Prednisolone 30 mg daily for 7–14 days – for all patients with significant increase in breathlessness, and all patients admitted to hospital, unless contraindicated

Decide where to manage (see table below)

Factors to consider when deciding where to manage patient

<table>
<thead>
<tr>
<th>Factor</th>
<th>Favours treatment at home</th>
<th>Favours treatment in Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to cope at home</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>Mild</td>
<td>Severe</td>
</tr>
<tr>
<td>General condition</td>
<td>Good</td>
<td>Poor - deteriorating</td>
</tr>
<tr>
<td>Level of activity</td>
<td>Good</td>
<td>Poor/confined to bed</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Worsening peripheral oedema</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Level of consciousness</td>
<td>Normal</td>
<td>Impaired</td>
</tr>
<tr>
<td>Already receiving LTOT</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Social circumstances</td>
<td>Good</td>
<td>Living alone/ not coping</td>
</tr>
<tr>
<td>Acute confusion</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rapid rate of onset</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Significant comorbidity (particularly cardiac and insulin dependent diabetes)</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>SaO2 &lt; 90%</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Changes on the chest radiograph</td>
<td>No</td>
<td>Present</td>
</tr>
<tr>
<td>Arterial pH level</td>
<td>≥ 7.35</td>
<td>&lt; 7.35</td>
</tr>
<tr>
<td>Arterial PaO2</td>
<td>≥ 7 kPa</td>
<td>&lt; 7 kPa</td>
</tr>
</tbody>
</table>

Abbreviations:
- LTOT - long term oxygen therapy
- SaO2 – oxygen saturation of arterial blood
- PaO2 – partial pressure of oxygen in arterial blood

Factors to consider when deciding where to manage patient

Hospital Investigations
* Chest X-ray
* Arterial blood gases (record inspired oxygen concentration)
* ECG
* Full blood count and urea and electrolytes
* Theophylline level if patient on theophylline at admission
* Sputum microscopy and culture if purulent

Home Investigations
- Sputum culture not normally recommended
- Pulse oximetry if severe exacerbation

Further management
- Arrange appropriate review
- Establish on optimal therapy
- Arrange multidisciplinary assessment if necessary

Factors to consider when deciding where to manage patient

Before discharge
- Establish on optimal therapy
- Arrange multidisciplinary assessment if necessary

Consider hospital-at-home or assisted-discharge scheme

Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
### Appendix D: Recommendations for proposed deletion

<table>
<thead>
<tr>
<th>Recommendation for proposed deletion</th>
<th>Details of replacement recommendation or rationale for deletion</th>
</tr>
</thead>
</table>
| Mild airflow obstruction can be associated with significant disability in patients with COPD. A true assessment of severity should include assessment of the degree of airflow obstruction and disability, the frequency of exacerbations and the following known prognostic factors:  
- FEV$_1$  
- TLCO  
- breathlessness (MRC scale)  
- health status  
- exercise capacity  
- body mass index (BMI)  
- partial pressure of oxygen in arterial blood (PaO$_2$)  
- cor pulmonale. | Replaced by recommendation 1.1.5.1 |
| The severity of airflow obstruction should be assessed according to the reduction in FEV1 as shown in table A (see end of appendix D). | Replaced by recommendation 1.1.6.1 and table 4 |
| Unless contraindicated, bupropion or nicotine replacement therapy combined with an appropriate support | Replaced by recommendation 1.2.1.3 |
programme should be used to
optimise smoking quit rates for people
with COPD.

| NICE Technology Appraisal Guidance No 39 (see Section 6) recommends: |
| “If a smoker’s attempt to quit is unsuccessful with treatment using either NRT or bupropion, the NHS should normally fund no further attempts within 6 months. However, if external factors interfere with a person’s initial attempt to stop smoking, it may be reasonable to try again sooner.” |

| NICE public health guidance 10 superseded NICE technology appraisal guidance 39. A cross-reference to the public health guidance has been added to recommendation 1.2.1.3 and the technology appraisal guidance 123 on varenicline has been incorporated into this guideline (see recommendations 1.2.1.4 and 1.2.1.5) |

| Patients who remain symptomatic should have their inhaled treatment intensified to include long-acting bronchodilators or combined therapy with a short-acting beta2 agonist and a short-acting anticholinergic. |

| Replaced by recommendations 1.2.2.5, 1.2.2.6, 1.2.2.7, 1.2.2.8 and 1.2.2.9. Long-acting bronchodilators are superior to regular short-acting bronchodilators. |

| Long-acting bronchodilators should be used in patients who remain symptomatic despite treatment with short-acting bronchodilators because these drugs appear to have additional benefits over combinations of short-acting drugs. |

| Replaced by recommendations 1.2.2.5, 1.2.2.6, 1.2.2.7, 1.2.2.8 and 1.2.2.9. These add further detail regarding sequence of substitution with long-acting bronchodilators. |

| Long-acting bronchodilators should |

| The GDG would have liked to stratify |

Chronic obstructive pulmonary disease: NICE guideline DRAFT (November 2009)
also be used in patients who have 2 or more exacerbations per year. outcomes by exacerbation frequency, but this level of detail is not possible. Some of the more recent studies show benefits in patients in whom prior exacerbations were not a study entry criterion.

| Inhaled corticosteroids should be prescribed for patients with an FEV₁ ≤ 50% predicted, who are having 2 or more exacerbations requiring treatment with antibiotics or oral corticosteroids in a 12 month period. The aim of treatment is to reduce exacerbation rates and slow the decline in health status and not to improve lung function per se. | Replaced by recommendations 1.2.2.6, 12.2.7, 1.2.2.8 and 1.2.2.9. Inhaled corticosteroids alone are inferior to the combination of inhaled corticosteroid and long-acting beta-agonist. |
| Clinicians should be aware of the potential risk of developing osteoporosis and other side effects in patients treated with high-dose inhaled corticosteroids (especially in the presence of other risk factors) and should discuss the risk with patients. | Replaced by recommendation 1.2.2.3. |
| If patients remain symptomatic on monotherapy, their treatment should be intensified by combining therapies from different drug classes. Effective combinations include: • beta2-agonist and anticholinergic • beta2-agonist and theophylline | Replaced by recommendation 1.2.4.1. Please note that although the evidence for this recommendation has not been reviewed the recommendation has been amended as a result of the review of evidence on combination therapies. |

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<table>
<thead>
<tr>
<th>Anticholinergic and theophylline</th>
<th>No longer applicable. An important outcome measure is prevention of exacerbations; success in this regard is much harder to judge but certainly not possible after just 4 weeks.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-acting beta2-agonist and inhaled corticosteroid</td>
<td></td>
</tr>
<tr>
<td>The clinical effectiveness of combined treatments can be assessed by improvements in symptoms, activities of daily living, exercise capacity and lung function. Combination treatment should be discontinued if there is no benefit after 4 weeks.</td>
<td></td>
</tr>
<tr>
<td>Pulmonary rehabilitation should be made available to all appropriate patients with COPD.</td>
<td>Replaced by recommendation 1.2.8.1</td>
</tr>
<tr>
<td>NICE Technology Appraisal Guidance No. 58 makes the following recommendation: “Within licensed indications, zanamivir and oseltamivir are recommended for the treatment of at-risk adults who present with influenza like illness and who can start therapy within 48 hours of the onset of symptoms.” The technology appraisal also notes that zanamivir should be used with caution in people with COPD because of risk of bronchospasm. If people with COPD are prescribed zanamivir they should be made aware of the risks and have a fast-acting</td>
<td>NICE technology appraisal guidance 168 superseded NICE technology appraisal guidance 58. A cross-reference to the technology appraisal guidance has been added to recommendation 1.2.9.1. We have also included a cross-reference to NICE technology appraisal guidance 158 (Oseltamivir, amantadine (review) and zanamivir for the prophylaxis of influenza).</td>
</tr>
</tbody>
</table>
bronchodilator available.

**Table A Assessment of severity of airflow obstruction according to FEV1 as a percentage of the predicted value**

<table>
<thead>
<tr>
<th>Severity</th>
<th>FEV₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild airflow obstruction</td>
<td>50-80% predicted</td>
</tr>
<tr>
<td>Moderate airflow obstruction</td>
<td>30-49% predicted</td>
</tr>
<tr>
<td>Severe airflow obstruction</td>
<td>&lt;30% predicted</td>
</tr>
</tbody>
</table>